PHYSICS

# SPEED

## Learning Goals

**B1.1** - Analyse technologies that apply the concepts related to kinematics.

**B2.1** - Use appropriate terminology related to kinematics.

**B3.1** - Distinguish between the terms constant, instantaneous, and average with reference to speed.

## Success Criteria

- ☐ Understand the concepts of Distance, Speed and Time.
- ☐ Know the mathematical relationship between these variables and how to use it to solve for a missing variable.
- ☐ Be able to convert distance and time units.

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**Speed** is a measure of how fast something is moving. Speed is said to be a ***scalar quantity*** as it does not have a direction associated with it. *Ex*. The cyclist reached a speed of 12.0 m/s during the race.

**Speed** can be written as a mathematical function involving the quantities ***distance*** and ***time***.

| | |
|---|---|
| $v = \frac{d}{t}$ | $v$ – Speed |
| | $d$ – Distance |
| | $t$ – Time |

In order to problem solve with a high rate of efficiency you must ***G.U.E.S.S.***

***G*** = Givens

***U*** = Unknov

***E*** = Equatio

***S*** = Solve

***S*** = Stateme

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***Ex 1.*** *Calculate the time required to drive from Windsor to Toronto and back if the distance between Windsor and Toronto is 350 km and you drive an average speed of 95 km/h.*

***Ex 2.*** *Commercial airplanes travel at speeds close to 1000 km/h, how far does a plane travel in 30 seconds?*

***Ex 3.*** *A snail can slime its way about 14.2 m in and hour.*

***a)*** *What is the snail's speed in m/s?*

***b)*** *What is the snail's speed in km/h?*

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# HOMEWORK

## SPEED PROBLEMS

**1.** Solve for the missing values in the following table.

| Trial | Distance | Time | Speed |
|---|---|---|---|
| 1 | 75.0 m | 6.65 s | |
| 2 | 3050 km | | 85 km/h |
| 3 | | 15.2 s | 12.2 m/s |
| 4 | 250 m | 13.5 s | |
| 5 | | 6.65 h | 75 km/h |
| 6 | 450 m | | 8.85 m/s |

**2.** Calculate the speed of sound, given that a clap of thunder is heard by an observer 1.5 km away, 4.6 s after the lightning that produced it is seen.

**3.** How far is the moon from the Earth, given that radio waves traveling at the speed of light ($3.0 \times 10^8$ m/s) take 1.28 s to reach the moon?

**4.** How long does it take light from the sun to reach Earth if it must travel $1.5 \times 10^8$ km at the speed of light ($3.0 \times 10^8$ m/s)?

**5.** In 1997, Thrust SSC, the world's fastest jet-engine car, traveled 604 m at an average speed of 341 m/s.

a. What length of time did this take?

b. Convert 341 m/s into km/h.

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## HOMEWORK

### Speed, Distance, Time Worksheet.

1. A girl cycles for 3hrs at a speed of 40 km/h. What distance did she travel?
2. A train travels at a speed of 30mph and travel a distance of 240 miles. How long did it take the train to complete it's journey?
3. A car travels a distance of 540km in 6 hours. What speed did it travel at?
4. John is a runner. He runs the 100m sprint in 10.6s. What speed did he travel at? (in m/s)
5. A cyclist travels 20km in 4hrs. What speed did the cyclist cycle at?
6. The distance between two cities is 144km, it takes me 3hours to travel between these cities. What speed did I travel at?
7. A coach travels from the station to the beach, a distance of 576km away in 6hrs. The coach is only allowed to travel at a maximum speed of 90km/h. Did the coach break the speed limit?
8. At the equator, the earth spins a distance of 40 000 km every day. What speed does the Earth spin at in km/h?
9. Lauren walks 100m in half a minute. What must her speed have been to travel this distance?
10. A mouse runs a distance of 2metres in 15 seconds. What is it's speed?
11. Jim travelled at a speed of 18km/h for 2 hours. What was the distance covered?
12. Marc was told his dinner would be ready at 18:00. He left his house at 12:00 and travelled in his car at an average speed of 45mph to his mum's house 300 miles away. Did Marc make it home in time for dinner?
13. A whale swims at a constant speed of 8m/s for 17s. What distance did it travel?